

NONDESTRUCTIVE EVALUATION (NDE) USERS SEMINAR COURSE OUTLINE

October 4th - October 7th, 2010, 9:00 am - 5:00 pm
Wheat Ridge, CO USA Office



Olson Instruments, Inc.

› **Structures/Pavements: 2 Days, October 4-5 (Mon - Tues)**

› **Seismic & Radar Geophysics: 1 Day, October 6 (Wed)**

› **Foundations: 1 Day, October 7 (Thur)**

In addition to NDE method presentations, questions/discussion sessions and hands-on demonstrations will be conducted for each NDE method by members of the class with an instructor's guidance. A total of 7.5 PDH certificate hours will be awarded each day for use in Professional Engineering registration continuing education requirements. Classes start and end at 9:00 am and end at 5:00 pm, with a daily 1/2 hr. lunch provided by Olson. Coffee, drinks, and snacks provided daily.

Seminar Costs - \$250/day

Register by: emailing info@OlsonInstruments.com, or online at www.OlsonInstruments.com/support/training and select the "NDE Users Seminar" link on the page. PayPal payments only if registering online.

Class size is limited to 30 participants, register early!

Contact our office if you would like assistance. Ex: letter of invitation for a US visa, lodging, etc.

Day 1 - 2 | 2 Days, October 4-5 (Mon-Tues)

Structural NDE Methods for Concrete, Masonry & Wood

Pavement NDE for Asphalt and Concrete Condition Assessment & Quality Assurance

- › Overview of ASCE 11/99 Guideline for Structural Condition Assessment of Existing Buildings
- › Overview of new draft International Concrete Repair Evaluation Committee Document On "Nondestructive Evaluation (NDE) Methods for Condition Assessment, Repair and Performance Monitoring of Concrete Structures" for methods and NDE investigation plans
- › Overview of ACI 228.1R-03 In-Place Methods of Determination of Strength of Concrete
- › Overview of ACI 228.2R – Nondestructive Evaluation Methods for Concrete
- › Ultrasonic/Sonic Pulse Velocity for Quality and Integrity on Concrete with 2-Sided Access
 - Test Procedures and Equipment
 - Pulse Velocity Physics and ASTM C597
 - Materials and Case Histories
 - Strength correlations
- › Impact Echo for Thickness and Integrity on Concrete with 1-Sided Access
 - Test Procedures and Equipment
 - Impact Echo Physics and ASTM C1338
 - Thickness Q/A
 - Materials and Case Histories for Void, Honeycomb, Cracking
 - Impact Echo Scanning

Day 1 - 2 | 2 Days, October 4-5 (Mon-Tues)...*continued*

Structural NDE Methods for Concrete, Masonry & Wood

Pavement NDE for Asphalt and Concrete Condition Assessment & Quality Assurance



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- » Spectral Analysis of Surface Waves on Concrete with 1-Sided Access
 - Test Procedures and Equipment
 - SASW Physics
 - SASW for Concrete Quality/Strength Correlation
 - Damage Evaluation of Cracking, Fire, Frost, Alkali-Silica Reaction

- » Ultrasonic Tomography
 - Tomography Algorithms
 - 2-D and 3-D Analyses

- » Galvanostatic Pulse, Concrete Resistance and Half-Cell Potential for Rebar Corrosion
 - Test Procedures and Equipment
 - Corrosion Measurement Physics
 - Case Histories

- » Ground Penetrating Radar
 - Test Procedures and Equipment
 - Structural Embedment Location
 - 2D and 3D data analyses
 - Bridge Deck Surveys for Delaminations
 - Void/Wet Subgrade Detection for Pavements and Slabs

- » Impact Echo for Rigid Pavement Thickness Determinations
 - Test Procedures and Equipment
 - Thickness QA and ASTM C1338
 - CALTRANS Study of Impact Echo for Thickness Determination of Concrete

- » Slab Impulse Response for Void Detection below Rigid Pavements
 - Test Procedures and Equipment
 - Physics and ACI 228.2R
 - Subgrade Void vs. Questionable vs. Sound Support
 - Correlations with Ground Penetrating Radar for Void Detection
 - Structural Case History

- » Multiple Impact Surface Waves (MISW) for Flexible and Rigid Pavements
 - Test Procedures and Equipment
 - MISW Physics
 - MISW Case Histories for Asphalt and Concrete Pavement System Layer
 - Thickness and Young's Modulus Determination

- » Resonance Testing of Cylinders, Beams and Cores for Freeze-Thaw Durability and Elastic Moduli
 - Test Procedures and Equipment per ASTM C215-08 for elastic moduli
 - Calculation of Young's and Shear Moduli, and Poisson's ratio
 - ASTM C666/666M-03 (2008) applications for Freeze-Thaw Durability



- » Stress Wave Basics for Engineering Geophysics
 - Compression Waves
 - Shear Waves
 - Surface Waves
 - Elastic Moduli

- » Crosshole Seismic
 - Test Procedures and Equipment
 - Review of ASTM D4428/4428M-07
 - Data Analysis and Elastic Property Calculations
 - Case Histories

- » Downhole Seismic
 - Test Procedures and Equipment
 - Review of ASTM D7400-08
 - Data Analysis and Elastic Property Calculations
 - Case Histories

- » Spectral Analysis of Surface Waves
 - Test Procedures and Equipment
 - Data Analysis and Elastic Property Calculations
 - Case Histories and comparisons with Crosshole Seismic Results

- » Multiple Impact Surface Waves or Multi-Channel of Surface Waves
 - Test Procedures and Equipment
 - Data Analysis and Elastic Property Calculations
 - Case Histories and comparisons with Crosshole Seismic Results

- » Seismic Refraction/Reflection
 - Test Procedures and Equipment
 - Review of ASTM D7128-05 and D5777-00
 - Data Analysis for Bedrock Depth Determination
 - Case Histories

- » Ground Penetrating Radar for Utility/Subsurface Investigation
 - Test Procedures and Equipment
 - Review of ASTM D6432 - 99(2005)
 - Data Analysis for Utility, Bedrock Depth and other Targets
 - Case Histories



- » Stress Wave Basics for Foundations
 - Compression Waves
 - Bending (Flexural) Waves
 - Surface Waves
- » Crosshole Sonic Logging for QA of Drilled Shaft Foundations, Auger Cast Piles and Diaphragm Walls
 - Test Procedures and Equipment
 - Review of ASTM D6760-08 and European Standard
 - CSL Ultrasonic Signal Analysis and anomaly/debonding considerations
 - Log Generation and Report Considerations
 - Velocity vs. Strength
 - Angled and Singlehole Sonic Logs
 - Research and Case History Results
 - When does an anomaly become a defect?
 - Comparisons with Gamma-Gamma Nuclear Density Logging
 - Destructive Coring/Drilling Considerations
 - General Repair Approaches
- » Crosshole Tomography for 2-D and 3-D Imaging of CSL Anomalies
 - Review of Tomography Algorithms
 - Data Collection Procedures in CSL tests for velocity tomography
 - Data Analysis of angled CSL data
 - Velocity Tomography Analyses
 - 2-D vs. 3-D Velocity Tomograms in Research and Case Histories
- » Sonic Echo/Impulse Response for Shaft/Pile Integrity and Length in QA and Forensic Studies
 - Test Procedures and Equipment
 - Review of ASTM D5882-07 and ACI 228.2R-98
 - Sonic Echo Physics
 - Impulse Response Physics
 - Research and Case History Results for Concrete, Wood and Steel Piles
 - Testing through Pilecaps and on Pile Sides
- » Ultraseismic for Abutment/Pier/Shaft/Pile Unknown Foundation Depths
 - Test Procedures and Equipment
 - Compressional vs. Flexural Wave Impacts and Responses
 - Analysis of data
 - Research and Case History Results for Concrete, Wood and Steel Foundations
- » Spectral Analysis of Surface Waves for Wall-Shaped Pier and Abutment Unknown Foundation Depths
 - Shallow and Deep Foundation Depth Determinations Test Procedures and Equipment
 - Review of ACI 228.2R-98
 - Surface Wave Physics
 - Research and Case History Results for Concrete and Masonry Foundations

Quality Assurance & Forensic NDE Methods for Foundations



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- » Parallel Seismic for Shallow and Deep Foundation Unknown Depth Determinations and Buried Piles below Pilecaps
 - Test Procedures and Equipment
 - Review of ACI 228.2R-98
 - Parallel Seismic Physics
 - Research and Case History Results for Concrete, Wood and Steel Piles and Masonry Piers/Abutments and Steel H-Pile and Sheet Pile Considerations
 - Combined Parallel Seismic and Cone Penetrometer testing
 - Unknown Foundation Depth Determinations for Bridge Scour Safety Studies

- » Induction Field for Steel Pile and Reinforced Concrete Pile/Shaft Unknown Depths
 - Test Procedures and Equipment
 - Induction Field Physics
 - Research and Case History Results for Steel Piles

- » Borehole Radar and Ground Penetrating Radar for Unknown Foundation Depths/Pile Locations
 - Test Procedures and Equipment
 - Review of ACI 228.2R-98
 - Research and Case History Results

- » Impact Echo for 1-sided Concrete Thickness and Integrity of Piers, Abutments and Pilecaps
 - Test Procedures and Equipment
 - Impact Echo Physics and ASTM C1338
 - Unknown Thickness Determinations

Seminar Location:

Olson Corporate Office
 12401 W. 49th Avenue
 Wheat Ridge, CO 80033-1927
 Hours: 9:00 am — 5:00 pm
 p: 303.423.1212
 f: 303.423.6071

Registration is available either by phone, email, or online at:

www.OlsonInstruments.com/support/training, and select “NDE Users Seminar”
 Contact Sue Jones at 303.423.1212 or email: info@OlsonInstruments.com